

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) AN EDGE PROTECTOR, MOULDING OR BEADING

(71) We, GRAHAMS (SEACROFT) LIMITED, a company organised under the laws of the United Kingdom, of Camcol House, Ring Road, Seacroft, Leeds, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to an edge protector, moulding or beading made of deformable material for bordering the edges of structures of constant or variable thickness. Throughout the remainder of this Specification, the edge protector, moulding or beading, which is substantially U-shaped in cross section, will be referred to as a beading. The beading is designed to be pushed over the edge to be bordered and it is adhered by friction to the marginal portion containing the edge.

20 Such beading is used, for example, in the automotive industry for bordering flange or sheet edges both hereinafter included in the term "flange edge", to act as an edge trimmer, or as a carrier for a seal, draught excluder or weathering strip. The beading contains a carrier which is U-shaped in cross section, and which is made of metal, rigid plastics material or of wire running in coils or of zig zag formation and having threads knitted into it. The purpose of the carrier is to bias the arms of the U-shaped beading together in order to increase the adhesion power of the beading. The carrier is at least partly surrounded by a covering material which may be made of a plastics material of a relatively high rigidity, such as for example polyvinylchloride with a hardness of about 75° Shore A, or it may be made of natural or synthetic rubber.

40 The present invention seeks to improve the ability of such beading to adhere to the flange edge to which it is to be applied.

45 To improve the adhesion powers of such beading, it is known to provide the reinforcing metallic carrier with points or edges

projecting through the covering material into the interior of the U, and these points or edges grip the surfaces of the flange edge to be protected. Such a construction provides a good grip, but it has the disadvantage that the surfaces of the flange edge may be damaged, especially if they are lacquered. Beading is also known which is made of a non-rigid plastics material for use, for example, when it is required to fix roof lining material in motor cars. The material is secured to the roof around the edges of the roof by the beading, and since the strong metallic grip of the above mentioned beading could easily cause tearing of the roof lining material, the beading made of non-rigid plastics material is used.

According to the present invention, we provide an edge protector, moulding or beading for mounting on a flange edge of constant or variable thickness, said beading being substantially U-shaped in cross section to enable it to be mounted on the flange edge with one arm of the U on either side thereof so as frictionally to engage the flange edge, and including a resilient, substantially rigid carrier of U-shaped cross section at least partly surrounded by a rubber or plastics covering material, the covering material being of 'U' Section and completely surrounding the outer surface of the carrier and at least an outer end portion of the inner surface of the arms of the carrier, that portion of the covering material which is adapted to engage the flange edge on which the beading is to be mounted comprising a pair of grippers one extending from the inner side of each arm of the covering material and at least confronting portions of said grippers being made of a less rigid (i.e. softer) material than the remaining part of the covering material, and being formed by extrusion integrally with the remaining part of the covering material.

The whole of the grippers may be made of the less rigid material.

The main body of the covering material

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may be made of solid rubber or solid neoprene and the less rigid material may be soft rubber, soft neoprene or sponge neoprene. Alternatively, the covering material may be made of polyvinylchloride of two different hardnesses. By forming that part of the covering material which is adapted to engage the flange edge of a softer material than the remainder of the covering material, a good seal is provided on the flange edge and dampness is therefore excluded. Furthermore, the part has greater elastic properties and therefore tends to adhere to the flange edge more satisfactorily.

The carrier may either form a loose fit within the covering material or it may be formed integral with the covering material.

Preferably at least a portion of the arm of the carrier are turned inwardly towards each other and in one embodiment, the grippers are wedge shaped and the non-confronting portions of each wedge shaped grippers are adjacent to or in use, are in contact with one of said inwardly turned portions of the arms of the carrier. In this construction, the wedge shaped grippers are bifurcated to provide two fins one of which comprises a gripper fin and the other of which is made of the other material. In this construction, the boundary line between the two fins of each wedge shaped gripper is preferably inclined outwardly towards a centre line of the beading at an angle of less than  $60^\circ$ , and preferably about  $15^\circ$ .

In alternative embodiments, fins of the softer material extend from the inner surfaces of the covering material on each arm of the beading for engagement with the flange edge.

Several embodiments of beading according to the invention are now described with reference to the accompanying drawings, in which:—

Figure 1 is a section through one embodiment, to an enlarged scale,

Figure 2 is a section through a second embodiment, to a smaller scale,

Figure 2a is a perspective view of a length of beading of the embodiment of Figure 2,

Figure 3 is a section through a third embodiment to the same scale as figure 2, and

Figure 4 is a section of a fourth embodiment to the same scale as Figure 3, the beading having been mounted on a flange edge.

Referring to Figure 1, of the accompanying drawings, the beading comprises a carrier 1, having a generally U-shaped cross-section, which has a generally U-sectional covering material 3 made of a polyvinylchloride, with a hardness of about  $75^\circ$  Shore A. The arms of the covering material are turned inwardly at 5 to embrace the free end 7 of the carrier 1. These free ends 7 are turned inwardly with respect to the remainder of the arms of the carrier 1 to enable the inwardly turned part 5 of the covering material to be held in place

and to provide a wedging and hence, a clamping action, as will be explained. As can be seen in Figure 1, entry to the interior of the beading is by way of a funnel shaped throat 9. A flange edge 11 to which the beading is to be applied is shown at the entrance to the throat 9.

The inwardly turned parts 5 of the covering material, which parts, as will become apparent, act as grippers are substantially wedge or V-shaped, and are each bifurcated at their innermost ends to provide a first pair of fins 13 adjacent the free ends 7 of the carrier 1, and a second pair of flange edge-embracing fins 15, the fins of a pair being thus oppositely transversely directed. The fins 13 are made of the same material as the main body of the covering material 3, but the fins 15 are made of a softer material than the remainder of the covering material, so as to provide a better grip on the flange edge 11. The covering material 3 is made by a known dual extrusion process. The softer fins 15 merge smoothly with the outer part of the throat 9, which is made of the harder material. The softer material may comprise a polyvinylchloride having a hardness of about  $60^\circ$  Shore A.

The boundary line 17 between the fins 13 and 15 makes an acute angle (preferably less than  $60^\circ$ ) with the centre line 19 of the beading and in the drawing this angle is shown as being between 10 and 15 degrees. Once the beading has been mounted on the flange edge 11, this angle is reduced to somewhat less than  $10^\circ$ . Because the free ends 7 of the carrier 1 are inwardly turned, it will be appreciated that if a force is applied to the beading once it has been mounted on the flange edge 11, to pull it off the flange edge, a wedging action will occur between the intumed free ends 7 of the arms of the carrier 1 and the flange edge 11, due to the shape of the intumed portion 5 of the covering material, and this wedging action will tend to compress the fins 15 thereby forcing them even harder on to the flange edge 11 with a clamping action, due to their natural resiliency. Because of the friction between the surfaces of the flange edge 11 and the surfaces of the fins 15, the fins 15 will tend to move outwardly of the beading with the flange edge 11, should any attempt be made to disengage the beading from the flange edge and this will therefore increase the wedging effect, with the result of a tighter clamping action.

In the embodiment shown in Figure 2, a similar construction is shown, but in this construction, the beading, instead of being made of plastics material, is made of rubber. Parts in the Figure 2 embodiment which are the same as in the Figure 1 embodiment bear the same reference numerals, and similar parts bear the same reference numeral followed by the suffix *a*. The covering material 3a is made

of a solid rubber or solid neoprene and forms a closer fit around the carrier 1 than in the Figure 1 construction. The fins 13 lie against the inner surface of the inwardly turned part 7 of the carrier 1 and only the tips of the edge embracing fins 15a are made of softer material than the remainder of the covering material 3a. This softer material is soft rubber, soft neoprene or sponge neoprene and the borders between the two materials lie substantially normal to the centre line 19 of the beading. This means that when the beading is mounted on a flange edge, there is less chance of the flange edge damaging the inner most part of the throat 9. The same wedging action is achieved, however, when an attempt is made to remove the beading from the flange edge. In the Figure 2 embodiment, the beading is provided with a tail 21 which forms a seal, for example for use on a car boot.

Referring now to the embodiment of Figure 3, there is shown a beading having a wire carrier 1b which is formed integral with the covering material 3b. In this construction the covering material 3b is cast around the carrier 1b. Both the carrier and the covering material are of U-shaped cross section with the arms of the U being slightly bent inwards towards each other and a tubular sealing portion 23 is secured to the outer curved surface of the U of the covering material as in known constructions of beading. The beading is provided on the inner surface of its arms with a plurality of fins 25 projecting from the covering material. Although two fins are shown for each arm, it will be appreciated that any number within reason may be provided. These fins 25 are made of a softer material than the remainder of the covering material and are formed by a dual extrusion process. As shown in the drawing, the fins are made of soft rubber, soft neoprene or sponge neoprene and the remainder of the covering material is made of solid rubber or solid neoprene. The fins 25 have substantially parallel upper and lower surfaces which are inclined inwardly into the interior of the beading and the inner most confronting edge faces of the fins are curved. The fins act as grippers.

In the embodiment of Figure 4, the beading has a sealing portion 21c somewhat similar to the sealing portion in the embodiment of Figure 2 and has a carrier cast into the covering material as in the Figure 3 embodiment. The carrier is again of generally U-shaped cross section with the arms of the U inclined inwardly towards each other, and is made mainly of a solid rubber or solid neoprene. The inner surface of the two arms of the U are again provided with a plurality of inwardly directed fins 25c and these fins are of substantially triangular cross section and formed by a dual extrusion process. The upper surfaces of the fins are inclined inwardly into the beading and the lower surfaces are in-

clined at a greater angle into the interior of the beading, and as in the previous embodiment, the fins act as grippers.

As will be appreciated from the above description, a feature common to all beading made in accordance with the present invention is that the main body of the covering material is made of a harder material than that part of the covering material which is adapted to engage the flange edge on which the beading is to be mounted. In all cases, the beading is made by a dual extrusion technique. Furthermore, the covering material may be made either of a plastics material or of synthetic or natural rubber material. It will also be appreciated that it is immaterial as to whether the carrier is integral with the covering material or whether the covering material is mounted on the carrier. The carrier may be of any known construction such as wire having a generally U-shaped cross section which has been bent upon its self in zig zag fashion and into which has been knitted cotton threads. Alternatively, it may be stamped out of a sheet of metal or rigid plastics material and suitably formed to provide a key between the covering material and the carrier, particularly if the covering material is cast or extruded around the carrier, or of any other known construction.

In all the embodiments described above, the covering material of the beading is manufactured by a dual extrusion process in which two separate extruders extrude the two different material compounds (i.e. soft and harder, respectively) into a common die and head where instantaneous fusion of the different compounds take place.

#### WHAT WE CLAIM IS:—

1. An edge protector, moulding or beading for mounting on a flange edge of constant or variable thickness, said beading being substantially U-shaped in cross section to enable it to be mounted on the flange edge with one arm of the U on either side thereof so as frictionally to engage the flange edge, and including a resilient, substantially rigid carrier of U-shaped cross section at least partly surrounded by a rubber or plastics covering material, the covering material being of U-section and completely surrounding the outer surface of the carrier and at least an outer end portion of the inner surface of the arms of the carrier, that portion of the covering material which is adapted to engage the flange edge on which the beading is to be mounted comprising a pair of grippers one extending from the inner side of each arm of the covering material and at least confronting portions of said grippers being made of a less rigid (i.e. softer) material than the remaining part of the covering material, and being formed by extrusion integrally with the remaining part of the covering material.

2. An edge protector, moulding or beading as claimed in Claim 1 in which the whole of the grippers is made of the less rigid material.
- 5 3. An edge protector, moulding or beading as claimed in Claim 1 or 2, in which the main body of the covering material is made of solid rubber or solid neoprene, and in which the less rigid material is soft rubber
- 10 4. An edge protector, moulding or beading according to Claim 1 or 2, in which the covering material is made of polyvinylchloride of two different hardnesses.
- 15 5. An edge protector, moulding or beading according to any one of Claims 1—4, in which the carrier forms a loose fit within the covering material.
- 20 6. An edge protector, moulding or beading according to any one of Claims 1—4, in which the carrier is formed integral with the covering material.
- 25 7. An edge protector, moulding or beading according to any one of the preceding claims, in which at least a portion of the arms of the carrier are turned inwardly towards each other.
- 30 8. An edge protector, moulding or beading according to Claim 7, in which the grippers are wedge shaped and in which the non-confronting portions of each wedge shaped gripper are adjacent to or in use, in contact with one of said inwardly turned portions of the arms of the carrier.
- 35 9. An edge protector, moulding or beading according to Claim 8, in which the wedge shaped grippers are bifurcated to provide two fins, one of which comprises a gripper fin and the other of which is made of the other material.
- 40 10. An edge protector, moulding or beading according to Claim 9, in which the boundary line between the two fingers is inclined outwardly towards a centre line of the beading at an angle of less than 60°.
- 45 11. An edge protector, moulding or beading according to Claim 10, in which said inclination is between 10° and 15° and less than about 10° when the beading is in use.
- 50 12. An edge protector, moulding or beading according to any one of Claims 1—7, in which the grippers comprise at least a pair of fins, one fin being joined to each arm of the beading.
- 55 13. An edge protector, moulding or beading according to Claim 12, in which each fin is inclined into the interior of the beading and has parallel sides, joined by an arcuate portion at their free ends.
- 60 14. An edge protector, moulding or beading according to Claim 12, in which each fin is triangular in cross section, the innermost surfaces of the fins being inclined inwardly into the beading and the outermost surfaces being inclined inwardly into the beading at a greater angle than the innermost surfaces.
- 65 15. An edge protector, moulding or beading substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings.
- 70 16. An edge protector, moulding or beading substantially as hereinbefore described with reference to Figures 2 and 2a of the accompanying drawings.
- 75 17. An edge protector, moulding or beading substantially as hereinbefore described with reference to Figure 3 or Figure 4 of the accompanying drawings.

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